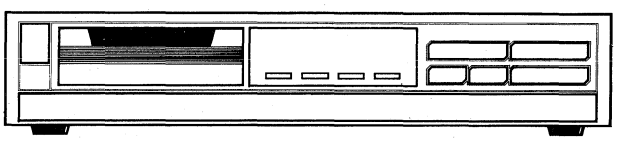
SERVICE MANUAL

COMPACT disc DIGITAL AUDIO

CLASS 1 LASER PRODUCT

CAUTION
Invisible laser radiation when open the unit.
Do not stare into beam.



CDP300R
CDP310R
Compact Disc Player

Sherwood

Technical Specification

System	Compact Disc Digital Audio System
Power voltages	100V, 120V, 220V, 240V ±10% (to be changed by transformer connections)
Mains Frequency	50, 60Hz
Power Consumption	≦20W
Frequency Range	2~20KHz ±0.3dB
Output Voltage	max. 2Vrms
S/N Ratio	≧96dB
Channel Separation	≧90dB(at 1RHz)
Channel Difference	≦1dB
Total Harmonic Distortion	≦0.005%(at −86dB)
Intermodulation Distortion	≦0.005%(at −86dB)
Remote Control	2Pin external connector for RC5 system AD 266R or AD255R or Receiver S2770R(CDP300R only) Computer Controlled Remote Commander for Self-remote Control(CDP310R only)
De-emphasis	0 or 15/50μs(switched by the subcode on the disc)
Headphone Output Level (CDP310R only)	max 140mV
Commander Section (CDP 310R only)	
Remote Control Functions	Totally 9 buttons
Remote Control Technics	32bits pulse code modulated infrared beam
Distance of Remote Control	10 meters minimum
Operating Angle	30° max. from right front of the IR receiver
Type of Dry BAT Battery	2X UM-3, Size AA or R6, 1.5V
Dimensions(W×H×D)	440×80×245mm
Weight	3.8kg(CDP300R only) 3.85kg(CDP 310R only)

NOTE:Design and specifications subject to change without notice for improvements.

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Servicing Hints

The set consists of various MOS ICs.
Because in general ICs are very sensitive to overloading and too high voltages, the highest care should be taken during servicing. See the information enclosed in the packaging of the ICs for further instructions.

• SERVICE AIDS

Audio test disc (No. 3)	4822 397 30085
Disc without errors+disc with DO errors, black spots and fingerprints (No. 5+No. 5A)	4822 397 30096

• DISASSEMBLY OF TOP COVER

– Remove the 4 screws out of side walls of top cover.
– Take top cover from set.

• REPLACEMENT OF GLASS FUSE F701

– Remove top cover.
– The glass fuse is situated on the **FUSE PCB** in the left-hand rear corner of the set.

• SERVICING OF THE FRONT PANEL

Disassembly of front panel

– Remove top cover.
– Remove the 4 fixing screws at both side of front panel.
– Remove the 3 fixing screws at under side of front panel.
– Ensure during mounting that the 3 bosses of the main chassis engage with the appropriate guiders of the front panel.

Disassembly of control+display PCB

– The control+display PCB can be taken out after removal of the 8 screws.

• SERVICING OF THE DECODER+POWER SUPPLY PCB

– Remove top cover.
– Remove the 3 screws on the decoder+power supply PCB.
– Remove the 2 screws at the upper side of the Heat Sink.
– Remove the screw in the back chassis for fixation of the RCA JACK.
– After the connectors have been disconnected the decoder+power suply PCB can be slid forwards and be taken out of the player.

• SERVICING OF THE SERVO+PREAMPLIFIER PCB (see Fig. 3)

– Remove top cover.
– Remove the front panel.
– Remove screw S4 and mecha supporter 26 (see exploded view) at the rear of the tray mechanism.
– Now the tray mechanism/CDM/servo+pre-ampl. PCB assy can be taken out of the frame and can be placed vertically in the appropriate servicing supports in the main chassis.
– In this way measurements and adjustments can be performed on the servo+preampl. PCB.
– See Service Manual C.D.M. –2 for measurements and adjustments on the servo+preampl. PCB.
– Ensure during mounting of the tray mechanism/CDM/servo+preampl. PCB assy that the cushion rubbers and springs item no. 28 and 27 are present (see exploded view).

• SERVICING OF THE TRAY MECHANISM/CDM/SERVO+PREAMPL. PCB ASSY

– Diassemble top cover.
– Disassemble front panel.
– Remove screw S4 and mecha supporter 26 (see exploded view) at the rear of the tray mechanism.
– Now the assy can be taken out of the set after the connectors have been disconnected.
– Remove disc tray LED guide PCB (see exploded view of tray mechanism).
– The CDM+servo+preampl. PCB is kept in place by a boss of the tray mechanism. If this boss, in the region of the foil connector is bent away the CDM+servo+preampl. PCB can be taken out of its support points of the tray mechanism.
– Ensure during mounting of the CDM/servo+preampl. PCB in the tray mechanism that the mechanism bracket item no. 24 (see exploded view of loading) is positioned properly.

• SERVICING OF THE TRAY MECHANISM

Disassembly of the tray mechanism

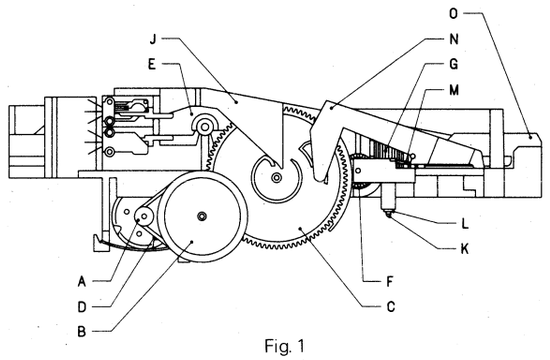


Fig. 1

– Remove pressure plate J by disassembling coil spring at rear. Then plate J can be taken out of its hinge points.
– Remove belt D.
– Disassemble pulley B after retain ring on shaft has been removed.
– Remove slide lever N by elevating lug M and sliding bracket out of its shaft guiding.
– Remove gearwheel G by removing shaft K after ring L has been taken away.
– Now disc carrier O can be taken out of he plate by lifting it at the front and sliding it out of the guiding.
– Next cam wheel C, switch bracket E and gearwheel F can be removed successively.
– The tray motor with belt wheel A can be taken out by removing the spring.

Assembly of tray mechanism

– Place disc carrier O in guiding and slide it in place (=disc carrier in position "close").
– Mount gearwheel F.
– Apply switch bracket E. The left-hand boss of the bracket should be positioned between the 2 switches.

– Ensure that the aperture in gearwheel F is vertical (see Fig. 1) and apply can wheel C in the way described in Fig. 2.

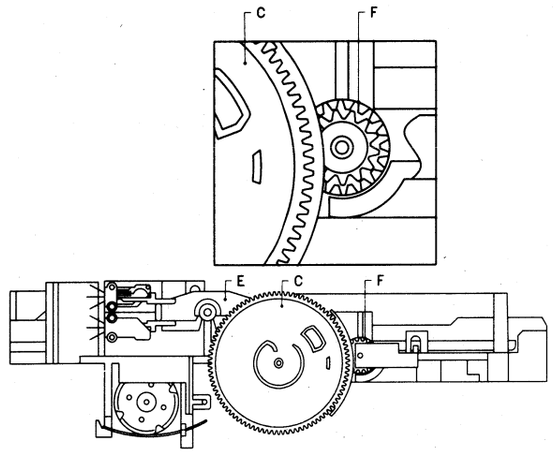


Fig. 2

– Turn cam wheel C counterclockwise till its final position and ensure that the boss of switch bracket E engages with the guiding at the rear of the cam wheel. Turn the cam wheel counterclockwise and clockwise and check if both switches are switched on alternately.
– Turn cam wheel C counterclockwise so that the upper switch is operated and mount pulley B in this position. Next apply the retain ring.
– Mount gearwheel G and apply shaft K and retain ring L. Ensure that gearwheel G is positioned before shaft and retain ring are mounted.
– Apply slide lever N. Ensure that the fork at the right of the lifting bracket encloses the guide rail of the tray.
– Mount the motor with pulley A and apply belt D.
– Next pressure plate J and the motor spring can be mounted.
– Check after mounting the working of the tray mechanism by turning pulley B counterclockwise and clockwise.

Electrical Measurements and Adjustments

For measurements and adjustments on the CD mechanism and the servo+preampl. PCB see the CDM-2 Service Manual.

Specification measurement

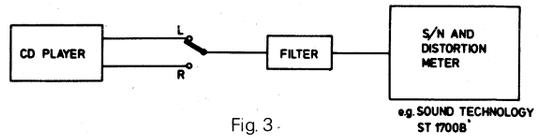


Fig. 3

To measure the specification use can be made of audio test disc No. 3
Use 7th order filter 4822 395 30204 (see Fig. 4) to measure:
– Total harmonic distortion (THD)
– Intermodulation distortion
– Signal-to-noise ratio (S/N)

Specification of 7th order filter

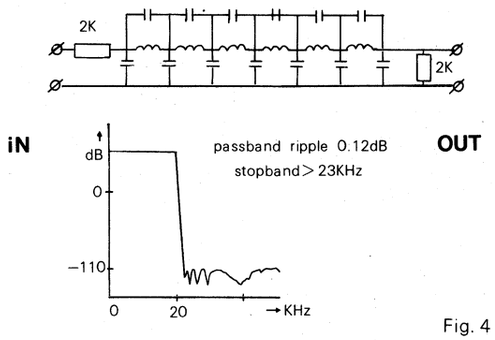


Fig. 4

Changing the transformer connections

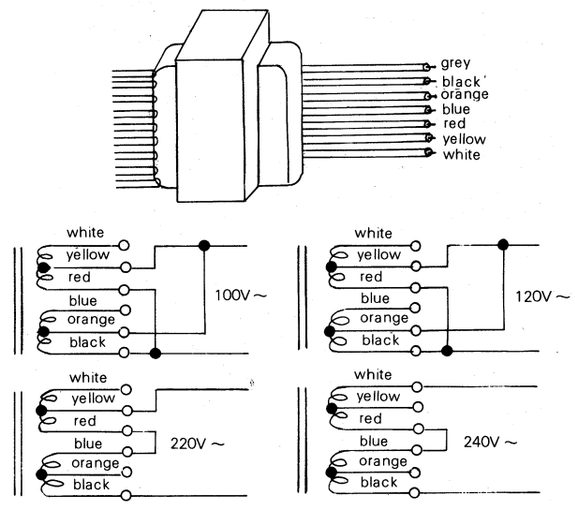


Fig. 5

If the set should be connected to a power voltage that deviates from the voltage mentioned on the type plate, the transformer connections should be changed, as indicated in Fig. 5.

ttention

case of the change of a power voltage, the glass fuse on the USE PCB should be changed to an adequate glass fuse as ollows.

- 100V~ : 500 mA-T
- 120V~ : 500 mA-T
- 220V~ : 250 mA-T
- 240V~ : 250 mA-T

DETAILED MEASURING METHOD FOR THE DECODER CIRCUIT

HINTS

Test discs

is important to treat the test discs with great care. The disorders n the discs (black spots, fingerprints, etc.) are exclusive and nambiguously positioned. Damage may cause additional drop-uts etc. rendering the intentional errors no longer exclusive. In hat case it will no longer be possible to check e.g. the good vorking of the track detectors.

Measurements on op-amps

n the electronic circuits op-amps have been used frequently. ome of the applications are amplifiers, filters, inverters and uffers.

n those cases where in one way or the other feedback has been pplied the voltage difference at the differential inputs converges o zero. This applies to both DC and AC signals. The cause can e traced to the properties of an ideal op-amp ($Z_i=\infty$, $G=\infty$, $_o=0$). If one input of an op-amp is directly connected to round it will be virtually impossible to measure at the inverting nd the non-inverting inputs. In such cases only the output sig-al will be measurable.

hat is why in most cases the AC voltage at the inputs will not be iven. The DC voltages at the inputs are equal.

timulation with "0" and "1"

uring troubleshooting sometimes certain points should be onnect to ground or supply voltage. As a result certain circuits an be brought in a desired state thus shortening the diagnosis me. In a number of cases the related points are outputs of op-mps. These outputs are short-circuit resistant, i.e. they can be rought to "0" or ground without problem.

he output of an op-amp, however, should never be con-ected directly to the power supply voltage.

Measurements on microprocessors

nputs and outputs of microprocessors should never be connected irectly to the power supply voltage. The inputs and outputs hould only be brought to "0" or ground if this is stated explicitly.

Measurements with an oscilloscope

uring measurements with an oscilloscope it is recommended to easure with a 1;10 test probe, since a 1:10 probe has a consider-bly smaller input capacitance than a 1:1 probe.

election of ground potential

is very important to select a ground point that is as close as ossible to the test point.

onditions for injection

- Injection of levels or signals from an external source should never take place if the related circuit has no supply voltage.
- The injected levels or signals should never be greater than the supply voltage of the related circuit.

Continuous burning of the laser

- Bridge capacitor 2174 on the servo+preampl. PCB.
- Connect $\overline{SI}$ (=pin 20 of IC6101 on the servo+preampl. PCB) to ground.
- Switch on the supply voltage.
- Now the laser will burn continuously.

Indiction of test points

In the drawings of the diagrams the test points have been indicated by a number (e.g. ⑫) to which the measuring method refers. In the measuring method below, the symbol (O) has been omitted for the test points indicated.

• GENERAL CHECKPOINTS

In the detailed measuring method below a number of general conditions, required for a properly functioning set, will not be mentioned. Before the detailed measuring method is started, these general points should first be checked.

a. Ensure that disc and objective are clean (remove dust, fingerprints, etc.) and work with undamaged discs.
b. Check if all supply voltages are present and if they have the correct values.
c. Check the good working of the two microprocessors by means of their built-in best program and servicing program.

Method:

Self-test of the servo μp

With the self-test the following parts of the μP are tested:

- RAM
- ROM
- TIMER
- serial I/O interface
- I/O gates

- Interrupt the I^2C connection on connector 35-2 on the servo+preampl. PCB.
- Unsolder pins 1, 7, 26 and 27 of the servo μP.
- Render pin 2 of the servo μP "low" (ground) and switch on the supply voltage.
- The test starts if pin 2 is rendered "high" again (interrupt the connection to ground).
- If all tests are positive, pin 1 of the servo μP will go low within 1 sec.

Self-test of the control and display μP

With this self-test the following parts of the μP are tested:

- RAM
- ROM
- TIMER
- serial I/O interface
- I/O gates

- Interrupt the I^2C connection on connector pin 35-4 on the control+display PCB.
- Render pin 2 of the control display μP "low" (ground) and switch on the supply voltage.
- The test starts if pin 2 is rendered "high" again (=interrupt the connection to ground).
- If all tests are positive, pin 1 of the control+display μP will go "low" again within 1s.

Initiation of the servicing program of the μP

— Servicing position "0"

Simultaneously depress the PREVIOUS, NEXT and TIME/TRACK buttons Keep these three buttons depressed while the mains voltage is switched on.

This is the STAND-BY mode, "0" appears on the display.

In this state it is possible to move the arm by means of the FORWARD and BACKWARD buttons with a minimum torque to the outside and the inside resp. This enables a check of the free motion of the arm across the disc.

— Servicing position "1"

From servicing position "0" the player can be brought in servicing position "1" by depressing the NEXT buttons.

In this state the laser emits light and the objective starts to focus. When the focal point has been reached, "1" appears on the display.

When **no** disc has been inserted the objective goes 16× up and down. Then the player reassumes servicing position "0".

As in servicing position "0" the arm can be moved across the diameter of the disc by means of the FORWARD and BACKWARD buttons.

— Servicing position "2"

To be reached by depressing the NEXT button after servicing position "1" has been reached.

The turntable motor starts to run

On the display appears "2"

In preparation of the transition to servicing position "3" the arm is sent to the center of the disc.

— Servicing position "3"

To be reached by depressing the NEXT button after servicing position "2" has been reached.

The radial control is switched on. The subcode information is ignored. $\overline{MUTE}$ is high so that the music information **is released.**

On the display appears "3"

(Dependent on the lenght of the lead-in track music will be reproduced after approx 1 min.)

In this state it is possible to move the arm by means of the FORWARD and BACKWARD buttons to the outside and to the inside resp. Now the motion is controlled by the μP and the arm moves by steps of 64 tracks as long as the buttons is depressed.

If one of the servicing positions 1, 2 or 3 is disturbed (e.g. braking or removing the disc) the palyer reassumes servicing position "0"

The servicing program can be left by switching the power switch (POWER ON/OFF) off and on. (Hardware reset).

① DEMOD IC

— Check the **motor speed.**
See "turntable motor control" in C.D.M.-2 Service Manual.

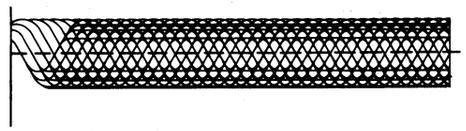
— Check the **HF signal on test point 65 (eye pattern)**

- Insert a disc.
- The HF signal should be present and be stable in the PLAY mode and in:
  SERVICING POSITION 3 after the run-in track has been read.

— In SERVICING POSITION 2 and during reading of the lead-in track the RF signal is not stable.

Position of oscilloscope 0,5μs/DIV

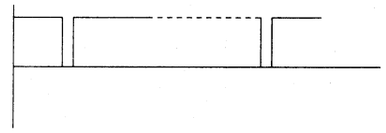
Amplitude≃1,5V_{pp}



— Check the **HFD signal** on **test point 97**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 the HFD signal is "high", however, minor pulses may be present and in cause of disorders on the disc.
- In SERVICING POSITION 2 and during playback of track no. 15 of test disc 5A HFD pulses are visible.

Position of the oscilloscope 5ms/DIV



— Check the **$\overline{MUTE}$ signal** on **test point 98**

- Insert a disc.
- In the PLAY mode or in SERVICING POSITION 3 in the **$\overline{MUTE}$** signal is "high".
- The **$\overline{MUTE}$** signal is "low" in SERVICING POSITIONS 0, 1 and 2, in the STAND-BY (only power switch depressed) and PAUSE modes and during jumping to a track after command NEXT or PREVIOUS.

— Check the **clock signal** on **test point 71**

- Insert a disc
- In the Stand-by mode (only power switch depressed) the frequency of the clock signal is 1,88 MHz.

In the PLAY mode or in SERVICING POSITIONS 2 or 3 the frequency of the clock signal is 4,32 MHz.

Remark: In SERVICING POSITION 2 the clock signal is unstable.

— Check the **timing signals** destined for the **ERCO IC**

- Bring the player in one of the following positions SERVICING POSITION 2 or 3 or the PLAY mode

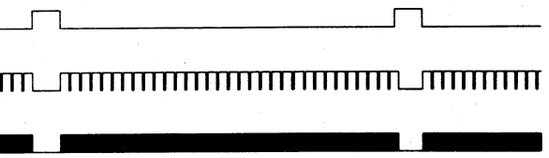
RemarK: In SERVICING POSITION 2 the timing signals are unstable.

- Trigger an oscilloscope with the **FSDE signal** on test point 72.
- Check signals

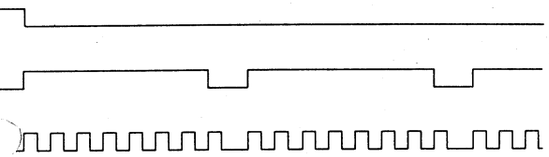
  $\overline{FSDE}$ on test point 72
  $\overline{SSDE}$ on test point 76
  $\overline{CLDE}$ on test point 77

  and their interelations

Position of the oscilloscope 20 μs/DIV
0=FSDE, tp 72;1=$\overline{SSDE}$, tp 76;2=$\overline{CLDE}$, tp 77



Position of the oscilloscope 1 μs/DIV
0=FSDE, tp 72;1=$\overline{\text{SSDE}}$, tp 76;2=$\overline{\text{CLDE}}$, tp 77



Remark: The repetition time of the FSDE signal on tp 72 is in the Stand-by mode and in SERVICING positions 0 and 1:312 μs in the PLAY mode and in SERVICING POSITIONS 2 and 3:136 μs

– Check the **DADE signal** on test **point 78**

- Insert a disc.
- In the PLAY mode or in SERVICING POSITION 3 activity should be present at test point 78 after the lead-in track has been read.

– Check the **subcode clock signals**

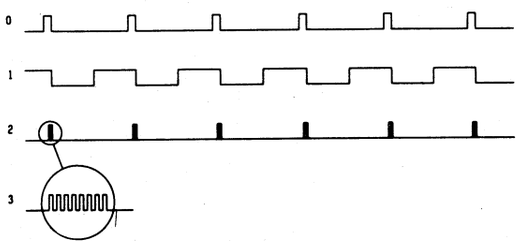
- Insert a disc.
- Bring the player in one of the following positions: SERVICING POSITION 3 or PLAY mode.
- Trigger an oscilloscope with the FSDE signal on test point 72.
- Check signals

FSDE	on test point 72
SWCL/QCLOCK	on test point 73
SBCL	on test point 74

and measure their interrelations

Positions of the oscilloscope 0,1 ms/DIV

0=FSDE	tp 72
1=SWCL/QCLOCK	tp 73
2=SBCL	tp 74
3=SBCL	tp 74



Remark: The repetition time of the FSDE signal on tp 72 is: in the STAND-BY mode and in SERVICING POSITIONS 0 and 1:312 μs in the PLAY mode and in SERVICING POSITIONS 2 and 3:136μs

– Check the **subcode data signals**

- Insert a disc.
- In the PLAY mode or in SERVICING POSITION 3 activity should be present at the following test points

S-DATA test point 75
Q-SYNC test point 95
Q-DATA test point 96

② ERCO IC

– Check the **timing signals coming** from the **DEMOD IC**

- SEE SUB "① DEMOD IC"
  'Check the timing signals destined for the ERCO IC'

– Check the **DADE signal** on **test point 78**

- See sub "① DEMOD IC"
  'Check the **DADE** signal on test point 78'

– Check the **CLOX signal** on **test point 94**

- In Stand-by mode (only power switch depressed) the frequency of the CLOX signal should be 4,2336 MHz.

– Check the **timing signals** destined for the **CIM IC**

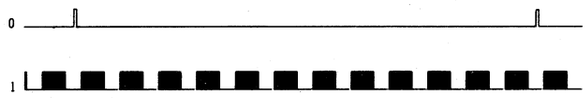
- Bring the player in the Stand-by mode (only power switch depressed).
- Trigger an oscilloscope with the FSEC signal on test point 79.
- Check signals

$\overline{\text{FSEC}}$ on test point 79
$\overline{\text{CLEC}}$ on test point 80

and their interrelations

Position of the oscilloscope 20μs/DIV

0=$\overline{\text{FSEC}}$ tp 79
1=$\overline{\text{CLEC}}$ tp 80



Remark: The repetition time of the FSEC signal is 136μs.

– Check the **$\overline{\text{MUTE}}$ signal** on **Test point 98**

- See sub "① DEMOD IC"
  'Check the $\overline{\text{MUTE}}$ signal on test point 98'

– Check the **DAEC signal** on **test point 81**

- **Insert a disc.**
- **In the PLAY MODE or in SERVICING POSITION 3 activity should be present at test point 81 after reading of the lead-in track.**

– **Check the MCES signal** on test point 66

- In the Stand-by mode the MCES signal is as indicated in the figure below.
  Position of the oscilloscope 50μs/DIV

Remark: The repetition time of the MCES signal is 140μs.

- Insert a disc.
- In the PLAY mode or in SERVICING POSITION 3 the MCES signal is as indicated in the figure below.

Remark: The repetition time of the MCES signal is 140μs. Duty cycle is 50%.
Also see "Measurement of turntable motor control" in C.D.M.-2 Service Manual.

– Check the **UNEC singal** on **test point 82**

- Insert test disc 5A.
- During playback of track no. 17 UNEC flags should briefly be present at test point 82.
  The UNEC flags are also present in case of soft braking of the disc and during fast forward or fast reverse (FORWARD, BACKWARD).

Remark: If the UNEC signal at test point 82 remains continuously "high", either the DEMOD IC or the ERCO IC or the RAM IC is defective.

③ CIM IC

– Check the **CLOX signal** on test **point 94.**

- See sub "② ERCO IC".
  'Check the CLOX signal on test point 94'

– Check the **timing signals coming from the ERCO IC.**

- See sub "② ERCO IC".
  'Check the timing signals destined for the CIM IC'

– Check the **DAEC signal on test point 81**

- See sub "② ERCO IC".
  'Check the DAEC signal on test point 81'

– Check the **UNEC signal on test point 82.**

- See sub "② EROC IC".
  'Check the UNEC signal on test point 82'

– Check the **timing signals** destined for the **FIL IC**

- Bring the player in the Stand-by mode (only power switch depressed).
- Trigger an oscilloscope with the STR1 signal on test point 84.
- Check signals

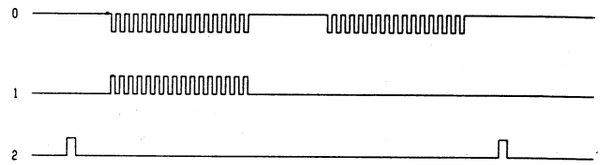
$\overline{\text{CLEC}}$ on test point 80
CLCF on test point 85
STR1 on test point 84

and their interrelations

Position of the oscilloscope 5μs/DIV

0=$\overline{\text{CLEC}}$ tp 80
1=$\overline{\text{CLCF}}$ tp 85
2=STR1 tp 84

Remark: The repetition time of the STR1 signal is 22 μs (f=44,1 kHz).



– Check the **DLCF signal** on test **point 86** and the **DRCF signal** on test **point 87**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 activity should be present at test points 86 and 87 after reading of the lead-in track.

④ FIL IC

– First check all signals round the CIM IC (see "③ CIM IC")

– Check the timing signals

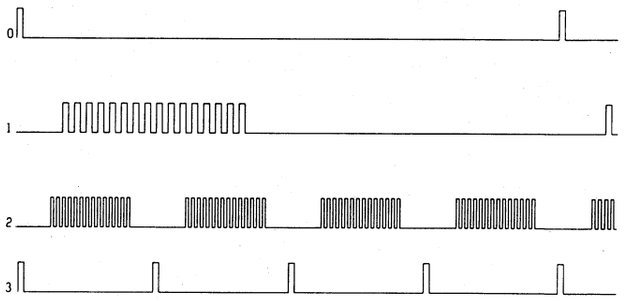
- Bring the player in the Stand-by mode (only the power switch depressed).
- Trigger an oscilloscope with the STR1 signal at test point 84.
- Check signals

$\overline{\text{STR1}}$ on test point 84
$\overline{\text{CLCF}}$ on test point 85
$\overline{\text{CLFD}}$ on test point 90
LAT on test point 93

and their interrelations.

Position of the oscilloscope 5μs/DIV

0=$\overline{\text{STR1}}$ tp 84
1=$\overline{\text{CLCF}}$ tp 85
2=$\overline{\text{CLFD}}$ tp 90
3=LAT tp 93



Remark: The repetition time of the LAT signal is 5,5μs (f=176,4 kHz).

– Check the **DLFD signal** on **test point 91** and the **DRFD signal** on **test point 92**

- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 activity should be present at test point 91 and 92 after reading of the lead-in track.

⑤ DAC IC

– First check all signals round the FIL IC, see "④ FIL IC".

– Check the output of the OP-AMP after the DAC IC.

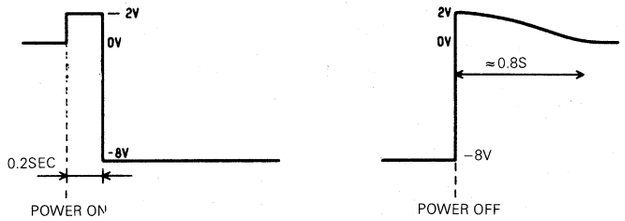
- Insert a disc.
- In the PLAY mode and in SERVICING POSITION 3 the analog (=music) signal should be present on the output of the OP-AMP after reading of the run-in track.

⑥ DEEMPH CIRCUIT

- Insert test disc 5.
- During playback of track no. 14 (recorded without PREEMPH) the DEEMPH signal on connector 34-4 should be 'high'.
- During playback of track no. 15 (recorded with PREEMPH) the DEEMPH signal on connector 34-4 should be 'low'.
- During playback of track no. 14 the analog signal should be present at the source of Q320 (to be measured at resistor R354, tp 67) and Q321 (to be measured at resistor R355, tp 68).
- During playback of track no. 15 the analog signal should be 0V at the source of Q320 (to be measured at resistor R354) and Q321 (to be measured at resistor R355).

⑦ KILL CIRCUIT

– During switching on and off of the mains voltage the signal on the collector of Q327 (to be measured on a jumper, tp 69) should be as indicated in the figure below.

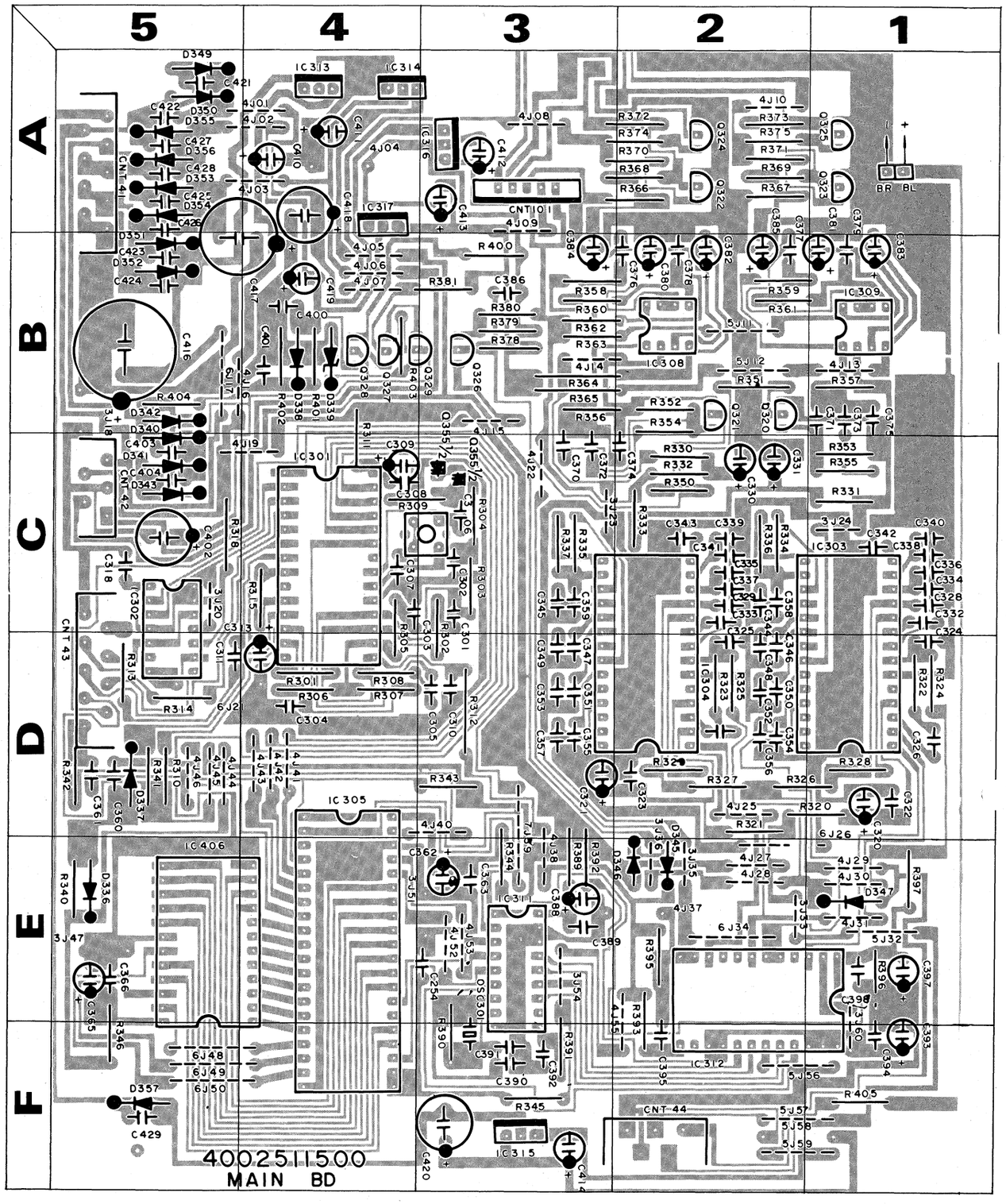


Parts List & Top View of P.C Boards

MAIN BOARD 4002511500

Ref No.	Parts No.	Description	Position
• IC			
IC301	2168400101	SAA 7010	C4
IC302	2108000103	74LS 74AN	D5
IC303	2108000164	TDA 1540P	D1
IC304	〃	〃	D2
IC305	2108000166	SAA 7020	E4
IC308	2168200105	LM 833N	B2
IC309	〃	〃	B1
IC311	2168400100	SAA 7000	E3
IC312	2108000165	SAA 7030	F2
IC313	2168611102	MC 7805C	A4
IC314	2168600105	MC 7905C	A4
IC315	2168600106	MC 7918C	F3
IC316	2168611101	MC 7812C	A3
IC317	2168609102	MC 7912C	A4
IC406	2108000163	HY61C16-70	E5
• TRANSISTOR			
Q320, Q321	2018207114	2SK 117GR	B2
Q322, Q324	2008610102	2SD 1302	A2
Q323, Q325	〃	〃	A1
Q326	2208206105	KTA 1015Y	B3
Q327	2008206104	KTA 970BL	B4
Q328	2208606104	KTC 1815Y	B4
Q329	2208606108	KTC 2240BL	B3
Q355 ½(×2)	2058819106	VARACTOR KV1236Z	C3
• DIODE			
D336	2058306101	IN 4148	E5
D337	〃	〃	D5
D338	〃	〃	B4
D339	2058513101	ZENER RD 3.9EB2	B4
D340, D341	2058106100	IN 4002	C5
D342	2058306101	IN 4148	B5
D343	〃	〃	C5
D345, D346	2058106100	IN 4002	E2
D347	〃	〃	E1
D349, D350	〃	〃	A5
D353, D354	〃	〃	A5
D355, D356	〃	〃	A5
D351, D352	〃	〃	B5
D357	〃	〃	F5
• CYRSTAL			
OSC301	3908101190	X-TAL 4.2336 MHz	F3
• COIL			
V.C.O	2638701001	COIL V.C.O	C3
• RESISTOR (Carbon Film, ¼W)			
R301, R306	3029684270	680K ohm 2%	D4
R302	3069183270	18K ohm	D3
R303	3069472270	4.7K ohm	C3
R304	3029103270	10K ohm 2%	C3
R305	3 29103270	18K ohm	D3
R307, R308	3029184270	180K ohm 2%	D4
R309	3029104270	100K ohm 2%	C4
R310	3069824270	820K ohm	D5
R311	3069189270	1.8 ohm	C4
R312	3069109270	1 ohm	D3
R313, R314	3069102270	1K ohm	D5
R315	3069472270	4.7K ohm	C4
R318	3069189270	1.8 ohm	C5
R320	〃	〃	D1
R321	〃	〃	D2
R322	3069101270	100 ohm	D1
R323	〃	〃	D2
R324	3069229270	2.2 ohm	D1
R325	〃	〃	D2
R326, R327	3069680270	68 ohm	D2
R328	3029272270	2.7K ohm 2%	D1
R329	〃	〃	D2
R330	〃	〃	C2
R331	〃	〃	C1
R332, R333	3029562270	5.6K ohm 2%	C2
R334	3069820270	82 ohm	C2
R335	〃	〃	C3
R336	3069621270	620 ohm	A2
R337	〃	〃	C3
R340	3029104270	100K ohm 2%	E5
R341	3069274270	270K ohm	D5
R342	3069331270	330 ohm	D5
R343	3069472270	4.7K ohm	D3
R344	3069109270	1 ohm	E3
R345	3069229270	2.2 ohm	F3
R346	3069189270	1.8 ohm	F5
R350	3069475270	4.7M ohm	D2
R351, R352	〃	〃	B2
R353	〃	〃	C1
R354	3069102270	1K ohm	C2
R355	〃	〃	A2
R356	〃	〃	B3
R357	3069182270	1.8K ohm	B1
R358, R360	3029222270	2.2K ohm 2%	B3
R359, R361	〃	〃	B2
R362, R363	3069101270	100 ohm	B3
R364, R365	〃	〃	B3
R366, R367	3029103270	10K ohm 2%	A2
R368, R369	3069101270	100 ohm	A2
R372, R373	〃	〃	A2
R370, R371	3069471270	470 ohm	A2
R374, R375	3069122270	1.2K ohm	A2
R378	3029104270	100K ohm 2%	B3
R380	3069183270	18K ohm	E2
R381	3029104270	100K ohm 2%	B3
R389, R392	3069109270	1 ohm	E3
R390	3069821270	820 ohm	F3
R391	3069229270	2.2 ohm	F3
R393	〃	〃	F2
R395	3029103270	10K ohm 2%	E2
R396	3069271270	270 ohm	E1
R397	3069221270	220 ohm	E1
R400	3029473270	47K ohm 2%	E2
R401	3069475270	4.7M ohm	B4
R402	3029473270	47K ohm 2%	B4
R403	3069332270	3.3K ohm	B4
R404	3069472270	4.7K ohm	B5
R405	3069271270	270 ohm	F1
• CAPACITOR			
C301	3679223120	M. 0.022μF/100V	C3
C302, C306	3579222530	C. 0.0022μF/50V	C3
C303	3679223120	M. 0.022μF/100V	C4
C304	3579222530	C. 0.0022μF/50V	D4
C305	〃	〃	D3
C307	3579821130	C. 820pF/50V	C4
C308	3509473534	C. 0.047μF/50V	C4
C309	3479247031	E. 47μF/16V	C4
C310	3509473534	C. 0.047μF/50V	D3
C311	〃	〃	D5
C313	3479210971	E. 1μF/50V	D4
C318	3509473534	C. 0.047μF/50V	C5
C320	3479247031	E. 47μF/ 16V	D1
C321			D3
C322, C324	3509473534	C. 0.047μF/50V	D1
C323, C325	〃	〃	D2
C326	〃	〃	D1
C327	〃	〃	D2
C328	〃	〃	C1
C329	〃	〃	C2
C330, C331	3479210071	E. 10μF/50V	C2
C332	3579821130	C. 820pF/50V	C1
C333	〃	〃	C2
C334, C336	3509104534	C. 0.1μF/50V	C1
C335, C337	〃	〃	C2
C338, C340	〃	〃	C1
C339, C341	〃	〃	C2
C342	〃	〃	C1
C343, C344	〃	〃	C2
C345	〃	〃	C3
C346	〃	〃	D2
C347	〃	〃	D3
C348, C350	3509473534	C. 0.047μF/50V	D2
C349	〃	〃	D3
C351, C353	〃	〃	D3
C352, C354	〃	〃	D2
C355, C357	〃	〃	D3
C356	〃	〃	D2
C358	3579222530	C. 0.0022μF/50V	C2
C359	〃	〃	C3

Ref No.	Parts No.	Description	Position
C360	3579103530	C. 0.01μF/50V	D5
C361	3579222530	C. 0.0022μF/50V	D5
C362, C388	3479247041	E. 47μF/25V	E3
C363, C389	3509473534	C. 0.047μF/50V	E3
C254	3579223530	C. 0.022μF/50V	E3
C365	3479247041	E. 47μF/25V	E5
C366	3579223530	C. 0.022μF/50V	E5
C370	3679512120	M. 0.0051μF/100V	C3
C371	〃	〃	B1
C372	3679153120	M. 0.015μF/100V	C3
C373	〃	〃	B1
C374	3679222120	M. 0.0022μF/100V	C2
C375	〃	〃	B1
C376, C377	〃	〃	B2
C378	3679122120	M. 0.0012μF/100V	B2
C379	〃	〃	B1
C380	3479247031	E. 47μF/16V	B2
C381	〃	〃	B1
C382	3479247031	E. 47μF/25V	B2
C383	〃	〃	B1
C384	3479210121	E. 100μF/10V	B3
C385	〃	〃	B2
C386	3579473534	C. 0.047μF/50V	B3
C390, C391	3529330210	C. 33pF/50V(CH)	F3
C392	3509473534	C. 0.047μF/50V	F3
C393	3479247041	E. 47μF/25V	F1
C394	3509473534	C. 0.047μF/50V	F1
C395	〃	〃	F2
C397	3479247041	E. 47μF/25V	E1
C398	3509473534	C. 0.047μF/50V	E1
C400, C401	3509104534	C. 0.1μF/50V	B4
C402	3409233141	E. 330μF/25V	C5
C403, C404	3509473534	C. 0.047μF/50V	C5
C410	3479247031	E. 47μF/16V	A4
C411	〃	〃	A4
C412, C413	3479247041	E. 47μF/25V	A3
C414	〃	〃	F3
C416	3409268231	E. 6800μF/16V	B5
C417	3409210231	E. 1000μF/16V	B5
C418	3409233141	E. 330μF/25V	A4
C419	3409210141	E. 100μF/25V	B4
C420	3409233161	E. 330μF/35V	F3
C421, C422	3509473534	C. 0.047μF/25V	A5
C423, C424	〃	〃	B5
C425~C428	〃	〃	A5
C429	〃	〃	F5



Control & Display PCB 4003510600

Ref No.	Parts No.	Description	Position
● IC			
IC252	2138000124	MAB 8441P T-018	D1
IC253	2168200103	MSM4202	C1
● TRANSISTOR			
Q255, Q256	2208206105	TR KTA 1015Y	B2
Q257, Q258	2208606104	TR KTC 1815Y	B2
Q259	〃	〃	F1
● DIODE			
LD253,LD254	2308220130	LED SLV56URC	B1
D251	2058306101	IN4148	C1
D255, D256	2058513103	ZENER RD5.1EB2	B2
● CRYSTAL			
OSC201	3908101150	CRYSTAL 6MHz	D1
● RECEIVER			
RCVR201	5568000001	RECEIVER HC-102	A1
● RESISTOR (Carbon film, ¼W)			
R251	3069229270	2.2 ohm	A1
R252	3069105270	1M ohm	D1
R253, R254	3069472270	4.7K ohm	A1
R256	3069102270	1K ohm	E1
R264	3069229270	2.2 ohm	D2
R265, R269	3069331270	330 ohm	A2
R266	3069472270	4.7K ohm	A2
R268, R271	3069331270	330 ohm	B2
R270	3069472270	4.7K ohm	B2
R272	3069339270	3.3 ohm	B1
R274	3069109270	1 ohm	B2
R275, R276	3069472270	47K ohm	A2
R278	3069470270	47 ohm	F1
R277	3069222270	2.2K ohm	F1
R280	3069680270	68 ohm	C2
R299	3069123270	12K ohm	C2
R279	3069222970	2.2K ohm(⅛W)	A1
● CAPACITOR			
C158	3479247041	E. 47μF/25V	B2
C251	3579223530	C. 0.022μF/50V	A1
C252	3479247021	E. 47μF/10V	A1
C253	3479210971	E. 1μF/50V	C1
C254, C255	3529330210	C. 33PF/50V(CH)	D1
C256	3479247041	E. 47μF/25V	C2
C257	3579223530	C. 0.022μF/50V	C2

※ Q259, RCVR201, R277, R278, R279 are used for Model No. CDP 310R only.
※ R255 is used for Model No. CDP 300R only.

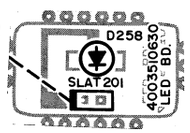
FUSE PCB 4003510620

Ref No.	Parts No.	Description	Position
● FUSE			
F401	5508211231	31.8mm 250mA/250V	
F402	5508211631	31.8mm 500mA/250V	

LED PCB 4003510630

Ref No.	Parts No.	Description	Position
● LED			
LD258	2308220127	LED SLR 34URC-3	

LED PCB 4003510630



COMMANDER PCB 4005511100

Ref No.	Parts No.	Description	Position
● IC			
IC901	5568100001	SAA 3006P	
● TRANSISTOR			
Q901	2208206105	KTA 1015Y	
Q902, Q903	2208606104	KTC 1815Y	
● DIODE			
D901, D902	2058306101	IN 4148	
D903	2408001100	INFRARED EL-IL2	
D904	2308060105	LED KLR 226 ERD	
● CERAMIC RESONATOR			
CSB901	3908001250	CSB 4 29P	
● RESISTOR (Carbon Film, ¼W)			
R901	3069102270	1K ohm	
R902	3069101270	100 ohm	
R903, R909	3069562270	5.6K ohm	
R905, R906	3069109270	1 ohm	
R907, R908	3069101270	100 ohm	
● CAPACITOR			
C901	3479210121	E. 100μF/10V	
C902	3529560210	C. 56pF/50V(CH)	

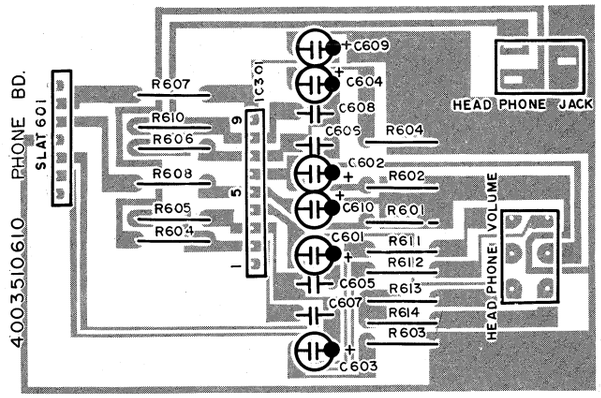
※ CDP310R ONLY

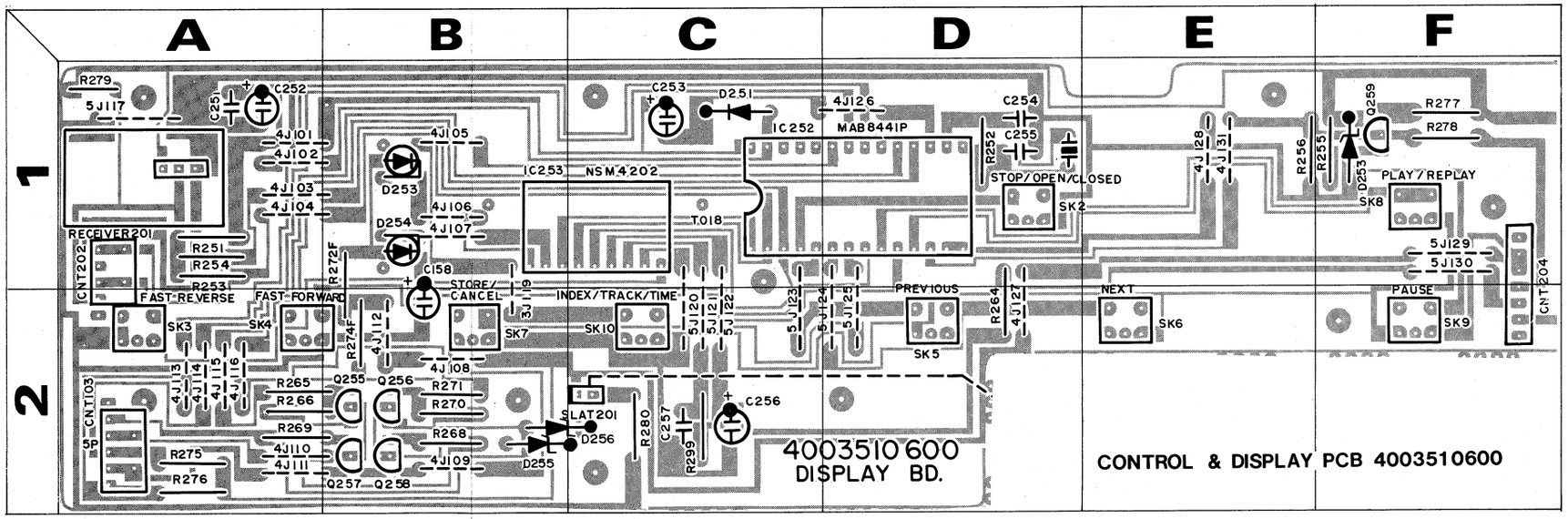
PHONE PCB 4003510610

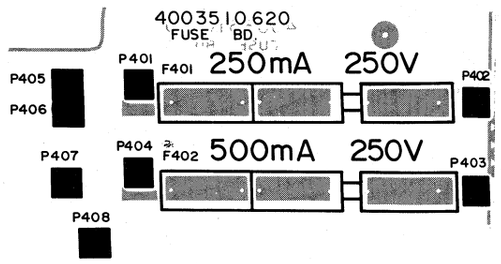
Ref No.	Parts No.	Description	Position
● IC			
IC301	2168020101	NJM4560S	
● RESISTOR (Carbon Film, ¼W)			
R601, R602	3069104270	100K ohm	
R603, R604	3069333270	33K ohm	
R605, R606	3069223270	22K ohm	
R607, R608	3069470270	47 ohm	
R609, R610	3069101270	100 ohm	
R611, R612	3069102270	1K ohm	
R613, R614	3069472270	4.7K ohm	
● CAPACITOR			
C601, C602	3479210071	E. 10μF/50V	
C603, C604	3479247021	E. 47μF/10V	
C605, C606	3579221130	C. 220pF/50V	
C607, C608	3579200130	C. 20pF/50V	
C609, C610	3479210071	E. 10μF/50V	

※ CDP310R ONLY

PHONE PCB 4003510610

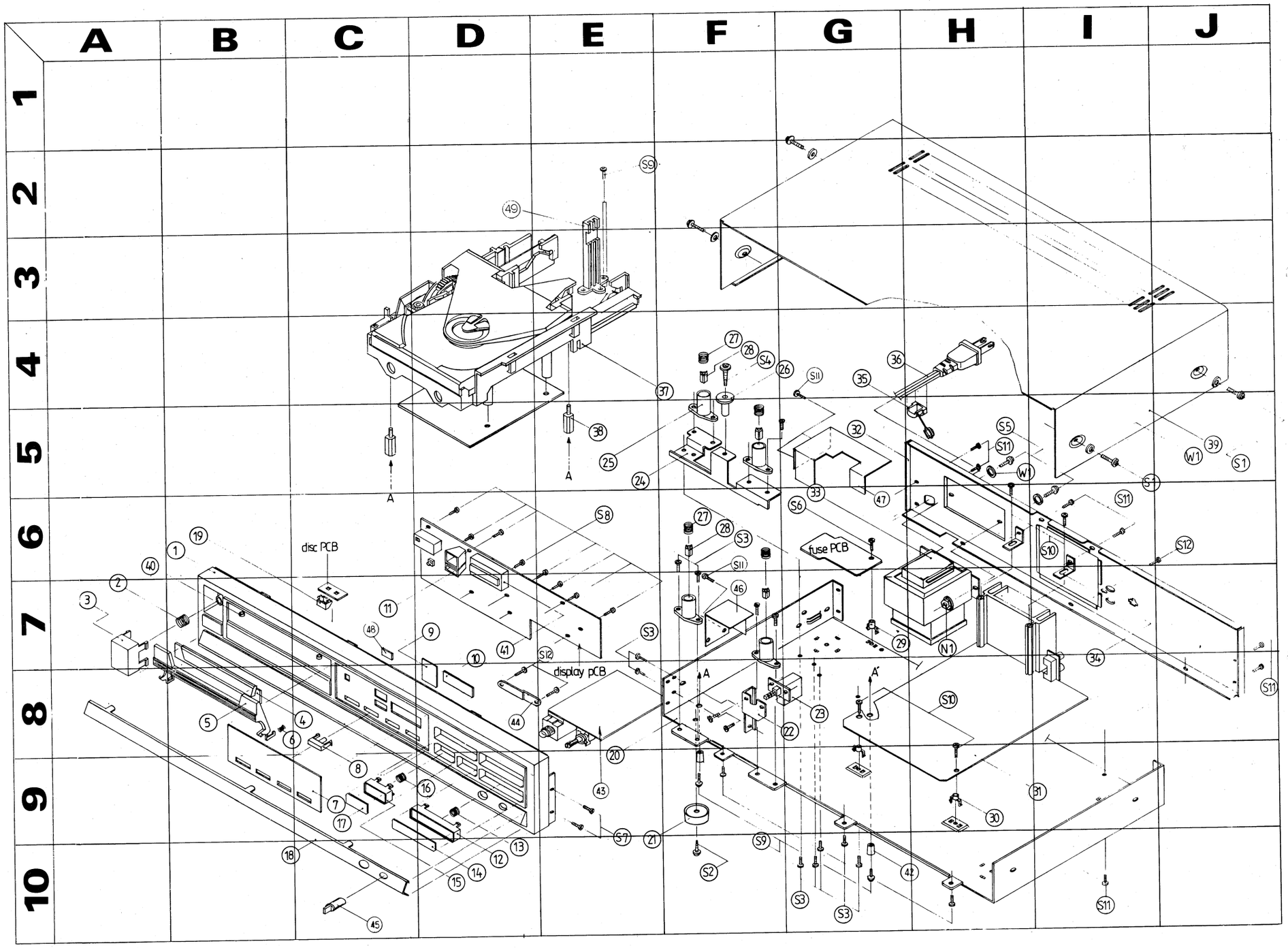






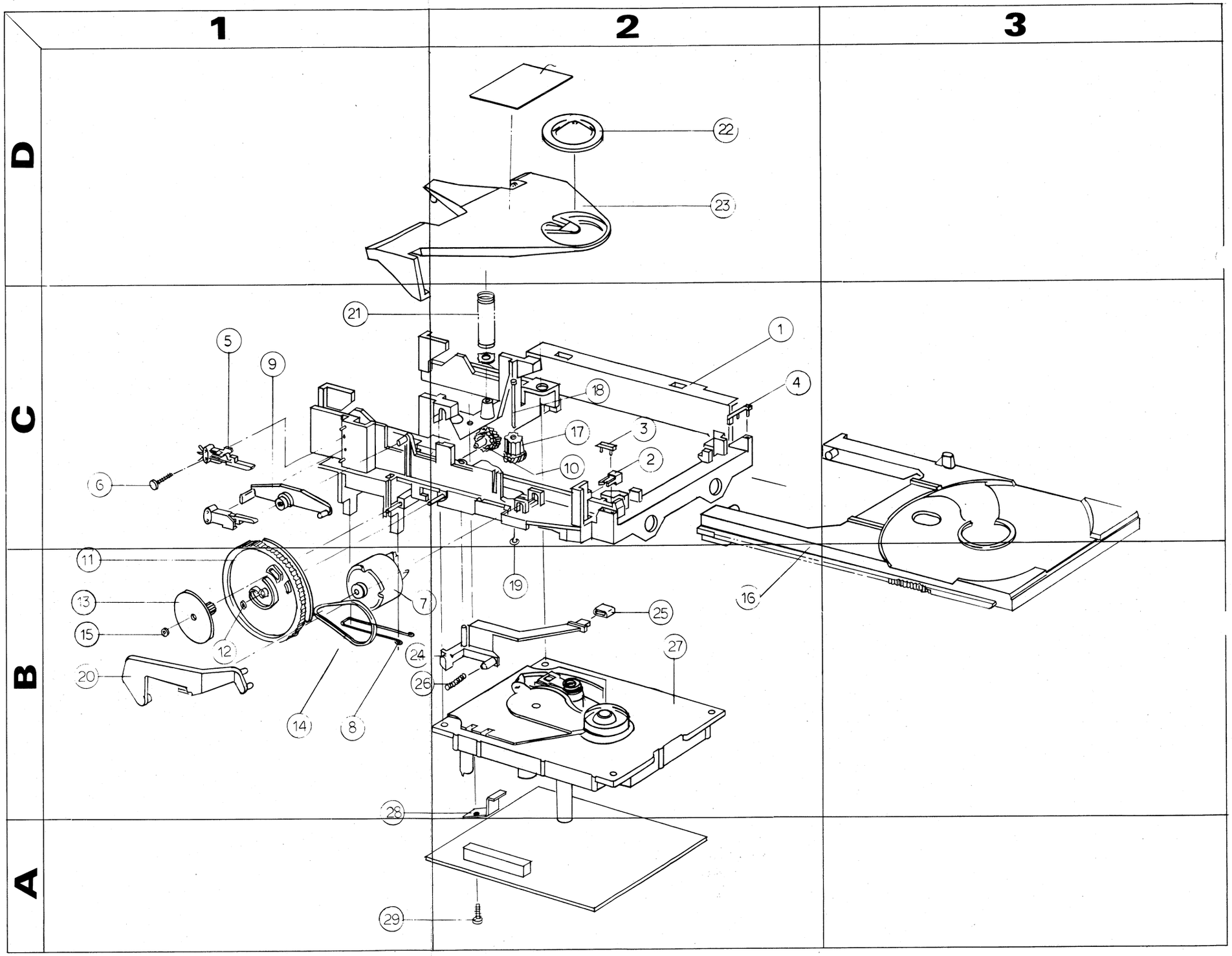
Parts List & Exploded View of Deck Mechanism Ass'y

NO.	PART NO .	DESCRIPTION	Q'TY	POSITION
1	048501006010	COVER FRONT	1	B6
2	6555601020	SPRING COIL	1	B7
3	48545026611	BUTTON PUSH (POWER)	1	A7
4	048555014011	WINDOW LED TRAY	1	C8
5	048523008111	LID TRAY	1	B8
6	6555004810	SPRING LID TRAY	1	C8
7	048555014111	WINDOW LED	1	C9
8	8545034410	BUTTON PUSH CON'	4	C8
9	8535011010	DIFFUSER	1	D7
10	8535010810	FILTER LED	1	D7
11	6045004710	GUIDE LED	1	C7
12	8545034410	BUTTON PUSH O/C	3	D10
13	6555003610	SPRING	3	D10
14	8535010910	NAME PLATE	3	D10
15	8545034210	BUTTON PUSH SEARCH	2	D10
16	6555003610	SPRING	2	C9
17	8635006210	PLATE KNOB	2	C9
18	048623002711	INLAY FRONT COVER	1	C10
19	6045004610	GUIDE TRAY LED	1	B6
20	6211613010	CHASSIS MAIN	1	E9
21	6305000310	FOOT RUBBER	4	E10
22	6505069710	BKT SWITCH POWER	1	G7
23	4628036010	SWITCH POWER	1	C8
24	6503008410	BKT MECHANISM	1	E5
25	6535004110	SUPPORTER SPRING	4	E5, E7
26	6535004210	SUPPORTER MECHA	1	F4
27	6555004910	SPRING CUSHION	4	F4, F6
28	6715011210	CUSHION RUBBER	4	F4, F6
29	6705004220	SPACER NYLON	1	C7
30	6705004210	SPACER NYLON	2	H9
31	4002511500	PCB MAIN	1	I9
32	046102018711	CHASSIS BACK	1	G5
33	2828042401	TRANSFORMER	1	G6
34	6505969610	BKT HEAT SINK	2	I7
35	6518008111	STOPPER CORD	1	G7
36	4308000220	CORD AC POWER	1	G4
37	5708005510	DISC MECHANISM ASS'Y	1	F4
38	6535004310	TRANSFIX MECHA	2	E5
39	040122112311	COVER TOP	1	J5
40	6715011310	CUSHION LED TRAY	2	A6
41	6045004810	GUIDE DIGITAL LED	1	D7
42	6045004910	GUIDE SCREW	2	H10
43	6045005010	INTERVAL GUIDE	1	E3
S1	8159440083	SCREW WSAM 4×8B	4	J5
S2	8159230081	SCREW #2 WPTC 3×8Y	4	F10
S3	8119430061	SCREW SAM 3×6Y	17	G10,F6,E7
S4	8159430203	SCREW WSAM 3×20B	1	F4
S5	8059140103	SCREW WPW 4×10B	2	H5
S6	8119230141	SCREW #2PTC 3×14Y	1	G6
S7	8129330063	SCREW #3FTC 3×6B	4	E9
S8	8119130061	SCREW #1PT 3×6Y	8	E6
S9	8119430081	SCREW SAM 3×8Y	4	F10
S10	8119230101	SCREW #2 PTC 3×10Y	4	I6, H8
S11	8119430053	SCREW SAM 3×5B	9	J8,I10,I6
S12	8119130063	SCREW #1PT 3×6B	1	J6
W1	8305000510	WASHER VINYL	6	J5, H5
N1	8209540011	NUT FLANGE	2	H7

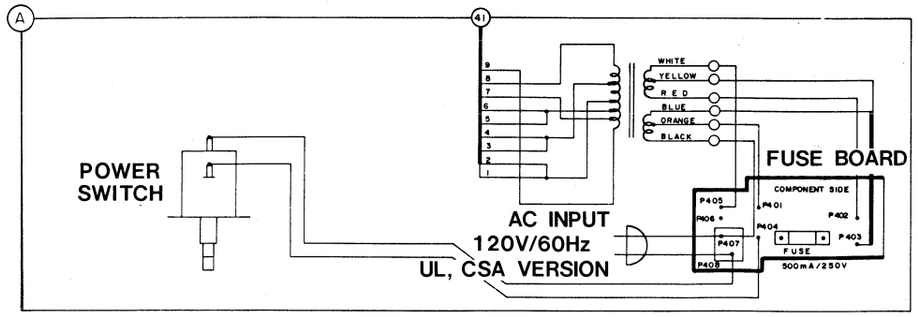


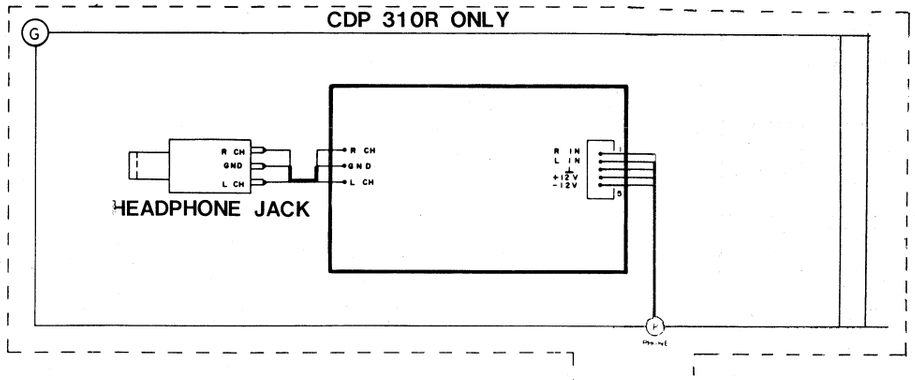
Parts List & Exploded View of Cabinet & Chassis

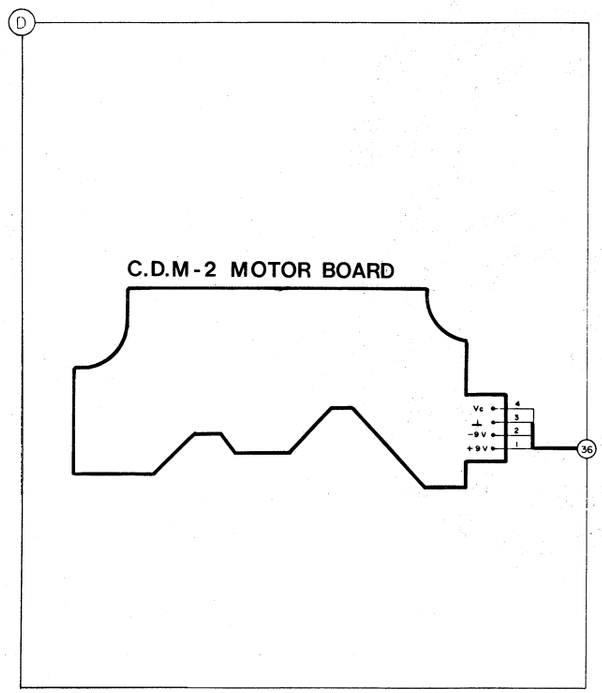
No.	PARTS No.	Philips	DESCRION	Q'TY	Position
1	6308000110	90357	CHASSIS	1	C2
2	6308000910	42792	CAP	1	C2
3	6308001010	43013	GUIDE PIECE L	1	C2
4	6308000810	43002	GUIDE PIECE R	1	C2
5	4648500710	36851	SWITCH	2	C1
6	8119120101		SCREW #1PT2×10B	2	C1
7	5558000310	52330	MOTOR ASS'Y	1	B1
8	6558000810	41481	SPRING MOTOR	1	B1
9	6308000510	90282	SWITCH BRACKET	1	C1
10	6308000610	90323	GEAR WHEEL A	1	C2
11	6308000310	90292	CAM WHEEL	1	B1
12	6528300410	40044	WASHER CAM WHEEL	1	B1
13	6308001210	43094	PULLEY	1	B1
14	6718000410	00841	CLUTCH DRIVE BELT	1	B1
15	6528300510	40123	RING PULLEY	1	B1
16	6308000210	00852	SLIDE ASS'Y	1	B2
17	6308000710	90333	GEAR WHEEL B	1	C2
18	6528100210	95034	SPINDLE GEAR WHEEL	1	C2
19	6528300610	04003	RETAIN RING	1	B2
20	6308000410	80345	LEVER SLIDE ASS'Y	1	B1
21	6558000710	41452	SPRING PRESSURE PLATE	1	C1
22	6308001310	90262	DISC CLAMPER	1	D2
23	6308001410	90364	PRESSURE PLATE	1	D2
24	6308001110	90274	BRAKE LEVER	1	B1
25	6718000810	70301	BRAKE BLOCK	1	B2
26	6558000910	41462	SPRING BRAKE LEVER	1	B1
27	5708005510	33232	CDMZ ASS'Y	1	B2
28	6508000310	36212	CLAMPING BRACKET	1	B1
29	8119130083		SCREW #1PT3×8B	1	A1

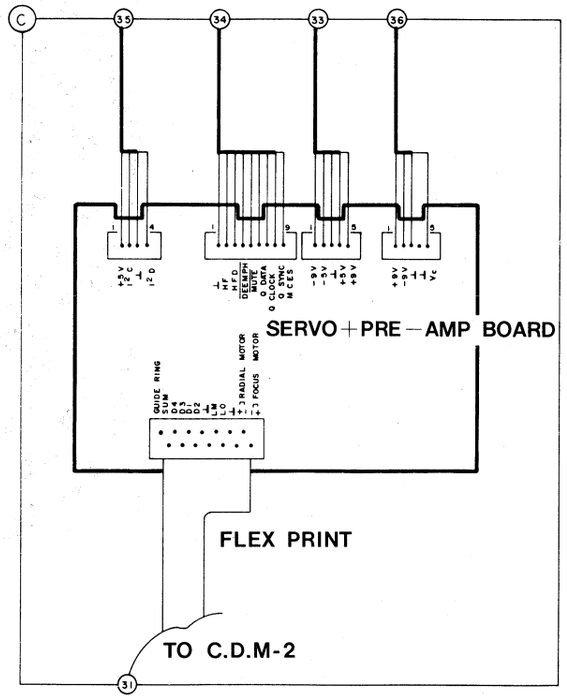


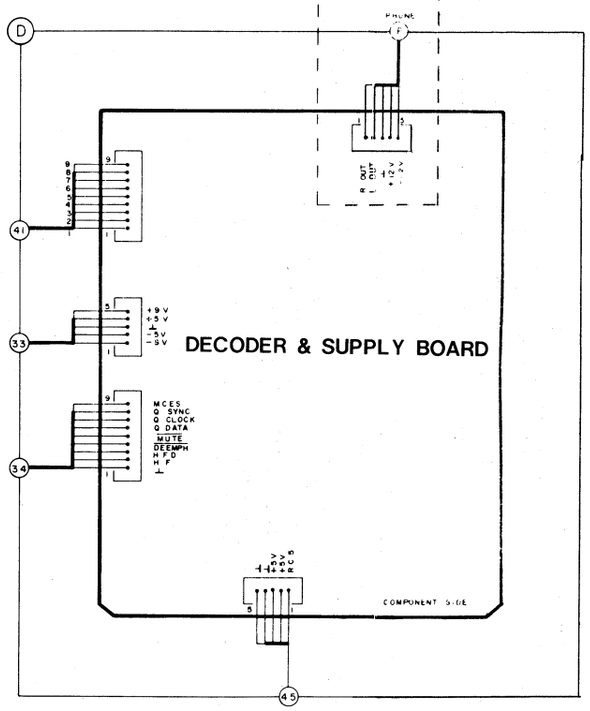
Point to Point Wiring Diagram

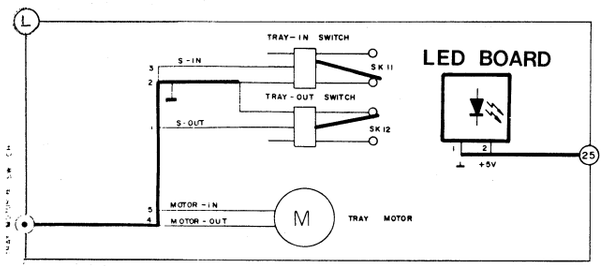


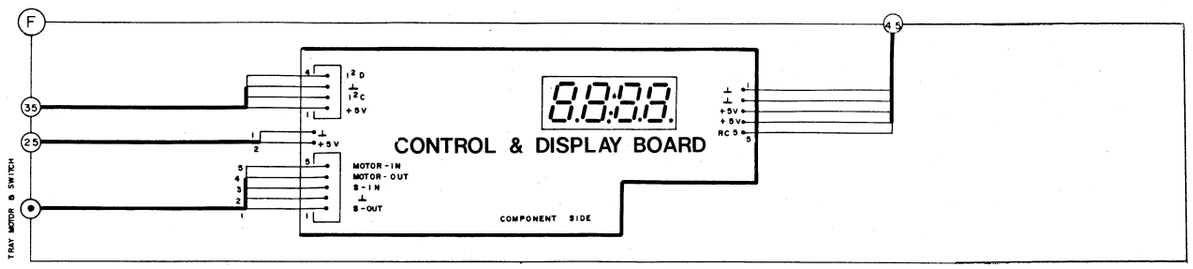




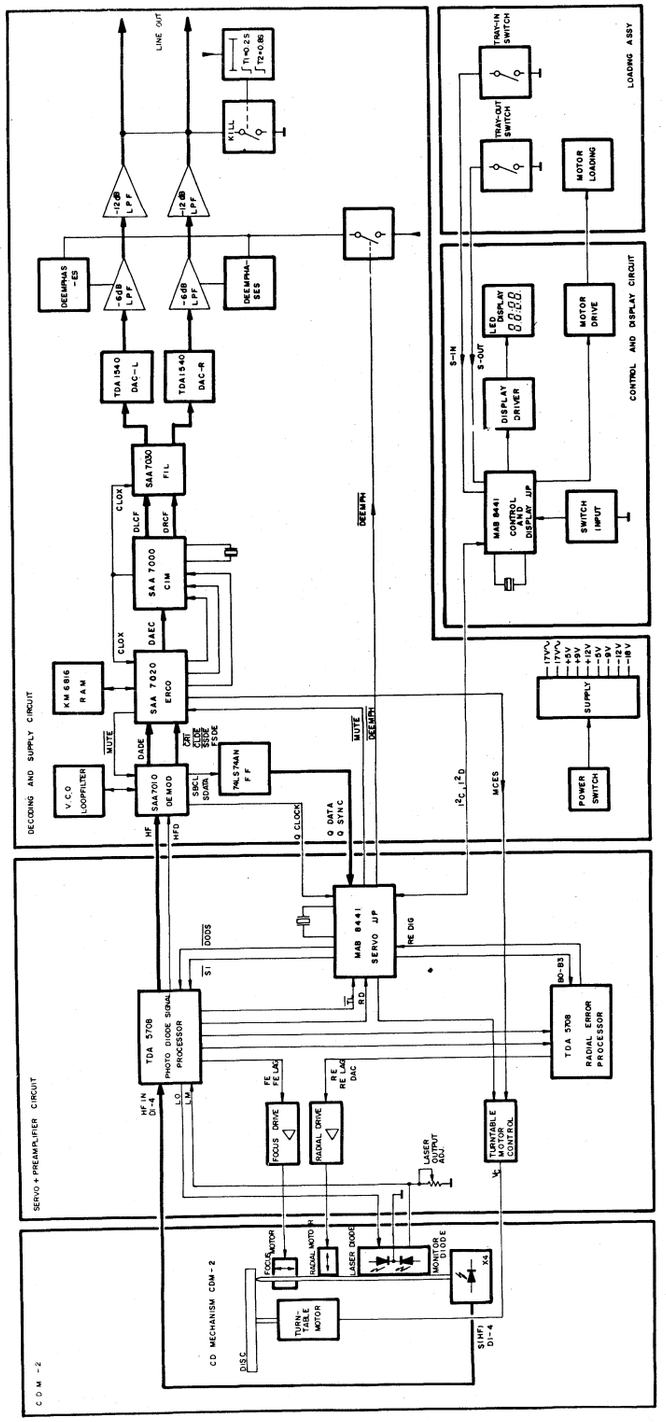








Block Diagram



FSDE	: FRAME SYNC. FROM DEMOD TO ERCO
FSEC	: FRAME SYNC. FROM ERCO TO CIM
S B CL	: SUB CODE BIT CLOCK
S DATA	: SUB CODE DATA
S-IN	: TRAY IN
S - OUT	: TRAY OUT
UNEC	: UNRELIABLE DATA FLAG FROM ERCO TO CIM

BO..B3	CONTROL BITS FOR RADIAL CIRCUIT
DAC	CURRENT OUTPUT FOR TRACK JUMPING (DIGITAL TO ANALOG CONVERTER)
DEEMPH	DEEMPHASIS
DOOS	DROP OUT DETECTOR SUPRESSION
DI0..4	PHOTODIODE CURRENTS
FE	FOCUS ERROR SIGNAL
FE LAG	FOCUS ERROR SIGNAL FOR LAG NETWORK
HF	HF OUTPUT FOR DEMOD
HFD	HF JITTER FREE OUTPUT FOR DEMOD
HF-IN	HF CURRENT INPUT
I²C	CLOCK SIGNAL SERVO-CONTROL µP
I²D	DATA SIGNAL SERVO-CONTROL µP
LA	LASER AMPLIFIER CURRENT INPUT
LO	LASER AMPLIFIER CURRENT OUTPUT
MCES	MOTOR CONTROL FROM ERCO TO SERVO CIRCUIT
MUTE	MUTE SIGNAL
Q CLOCK	SUBCODE CLOCK INPUT FOR SERVO µP
Q DATA	SUBCODE DATA INPUT FOR SERVO µP
Q SYNC	SUBCODE SYNCHRONIZATION INPUT FOR SERVO µP

RE	: RADIAL ERROR SIGNAL
RE I	: LASER FEEDBACK CURRENTS)
	: RADIAL ERROR SIGNAL 1
	(SUMMATION OF AMPLIFIED CURRENTS D1 AND D2)
RE 2	: RADIAL ERROR SIGNAL 2
	: ILLUMINATION AMPLIFIED CURRENTS D3 AND D4)
RE DIG	: RADIAL ERROR DIGITAL
RE LAG	: RADIAL ERROR SIGNAL FOR LAG NETWORK
R D	: READY SIGNAL FOR SERVO µP PROCESSOR FINISHED
ST	: START SIGNAL FOR LASER SUPPLY AND FOCUS CIRCUIT
TL	: TRACK LOSS SIGNAL
V C	: CONTROL VOLTAGE FOR TURNTABLE MOTOR
CLEC	: CLOCK FROM ERCO TO FIL
CLOX	: CLOCK FROM ERCO TO CIM
CLSY	: CLOCK FROM CIM (SYSTEM CLOCK)
CRI	: COUNTER RESET INHIBIT
DADE	: DATA FROM DEMOD TO ERCO
DAEC	: DATA FROM ERCO TO CIM
DLCF	: DATA LEFT FROM CIM TO FIL
DRCF	: DATA RIGHT FROM CIM TO FIL

9017016000

Schematic Diagram

CDP 300R/CDP 310R

MOTOR BD.

SERVO + PREAMPLIFIER BD.

- TURNTABLE MOTOR CONTROL-

6112, 6113 : BZV46/2V

6110, 6111, 6116 : IN4148

CDM-2

DIODE ASSEMBLY

GUIDE RING PHOTODIODE

D4

D3

D1

D2

FLEX. PRINT (FOIL)

LASER ASSEMBLY

LASER

MONITOR

RADIAL

FOCUS ACTUATOR

6101 TDA 5708 PHOTO DIODE SIGNAL PROCESSOR

HF AMPLITUDE

EQUAL-IZER

AMPLITUDE DETECTOR

HF AMPLITUDE SLICERS

GAIN CONTROL

STARTING CIRCUIT

LASER SUPPLY

FOCUS NORMALIZING CIRCUIT

LASER OUTPUT ADJ.

ROM

3 1/2-BIT DAC

switches

- FOCUS DRIVE-

L 272 MB

MC 1458P

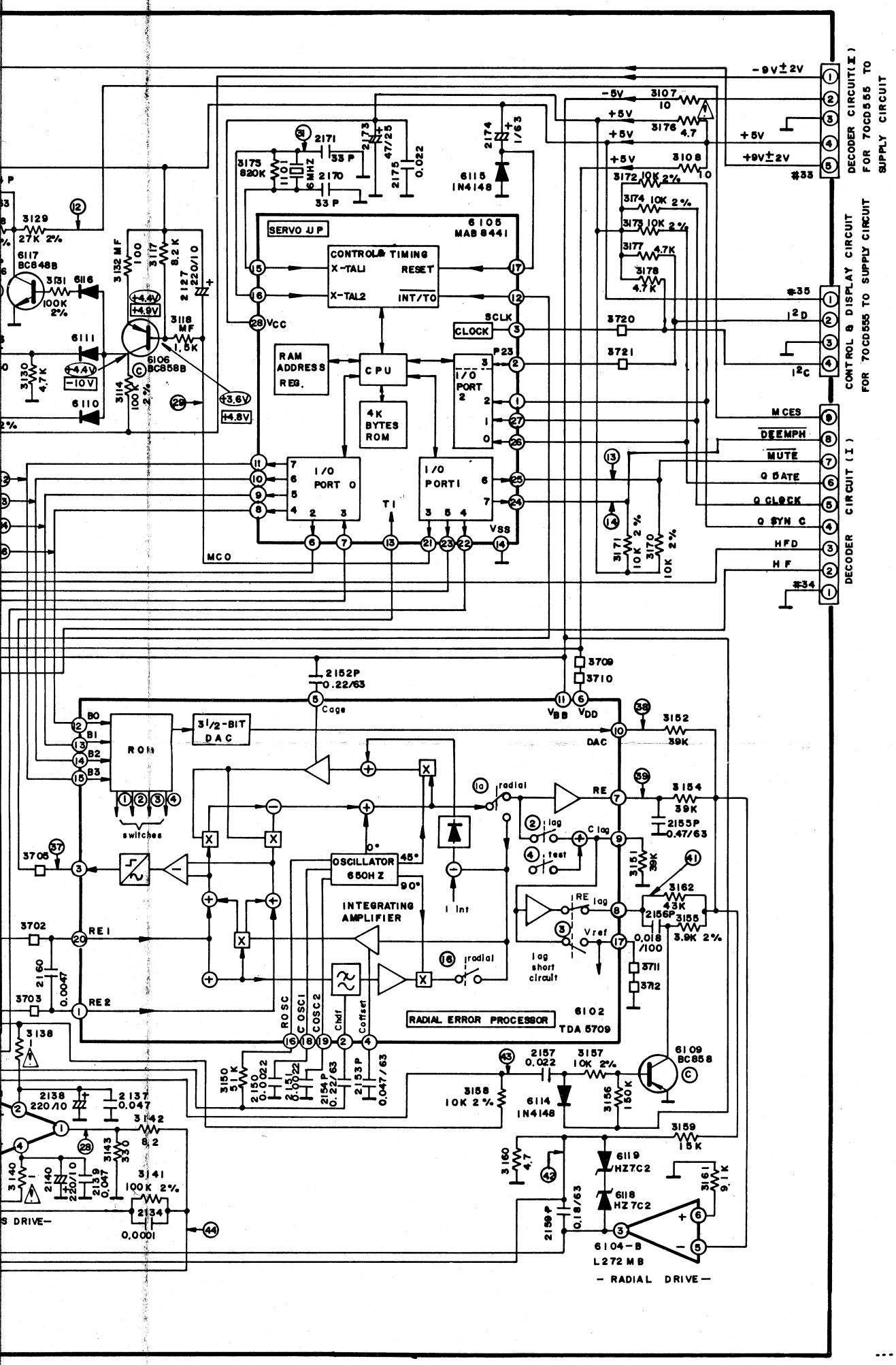
LM 324

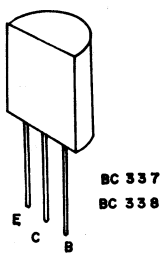
TDA 5709P

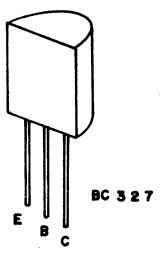
TDA 5708 P
MAB 8441 P

BC 33
BC 33

chematic Diagram
DP 300R/CDP 310R



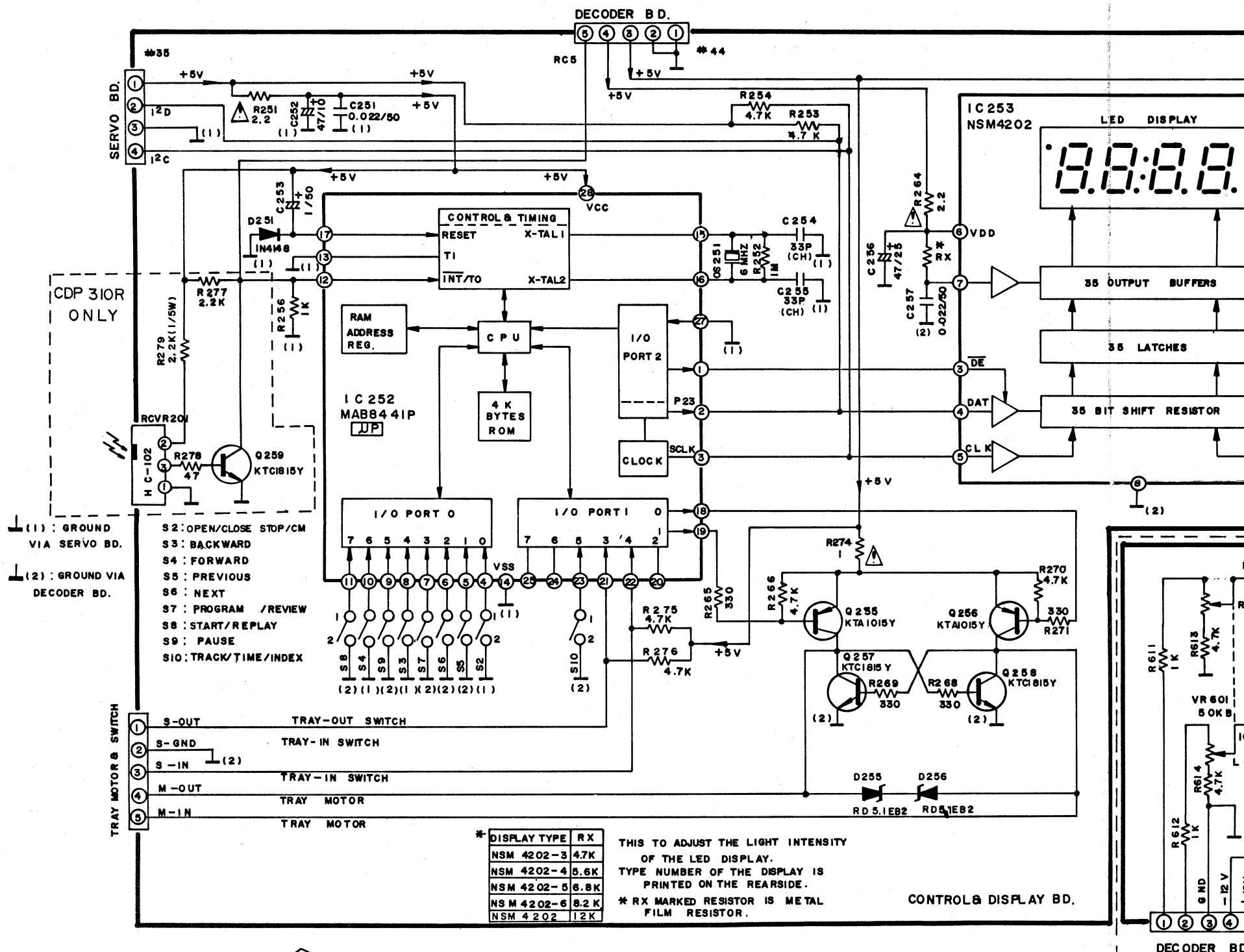




---P MARKED CAPACITORS ARE POLYESTER FLAT FOIL CAPACITORS

Schematic Diagram

CDP 300R/CDP 310R



(1) : GROUND VIA SERVO BD.

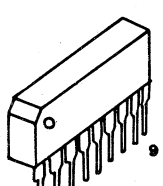
(2) : GROUND VIA DECODER BD.

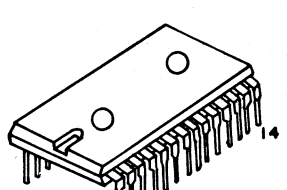
S2 : OPEN/CLOSE STOP/CM
S3 : BACKWARD
S4 : FORWARD
S5 : PREVIOUS
S6 : NEXT
S7 : PROGRAM /REVIEW
S8 : START/REPLAY
S9 : PAUSE
S10 : TRACK/TIME/INDEX

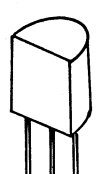
* RX MARKED RESISTOR IS METAL FILM RESISTOR.

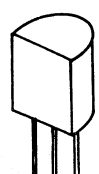
DISPLAY TYPE	RX
NSM 4202-3	4.7K
NSM 4202-4	5.6K
NSM 4202-5	6.8K
NSM 4202-6	8.2K
NSM 4202	12K

THIS TO ADJUST THE LIGHT INTENSITY OF THE LED DISPLAY.
TYPE NUMBER OF THE DISPLAY IS PRINTED ON THE REARSIDE.

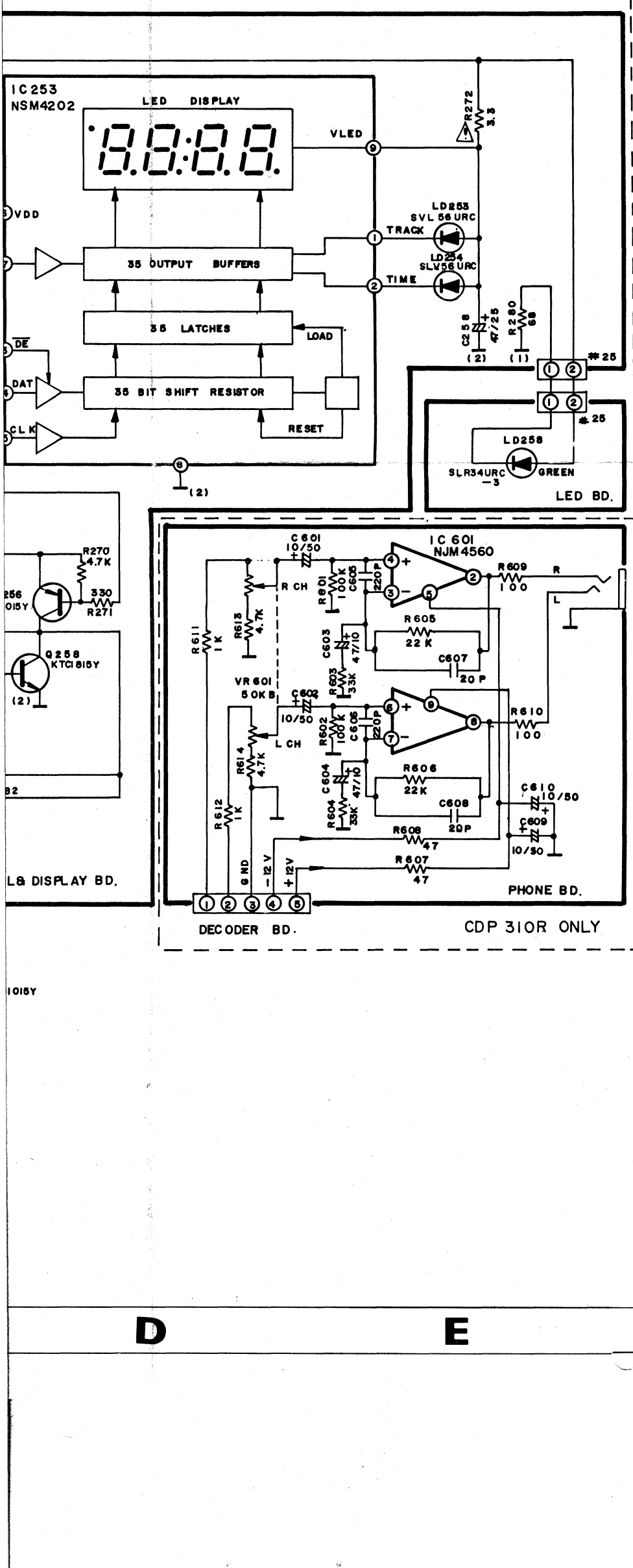








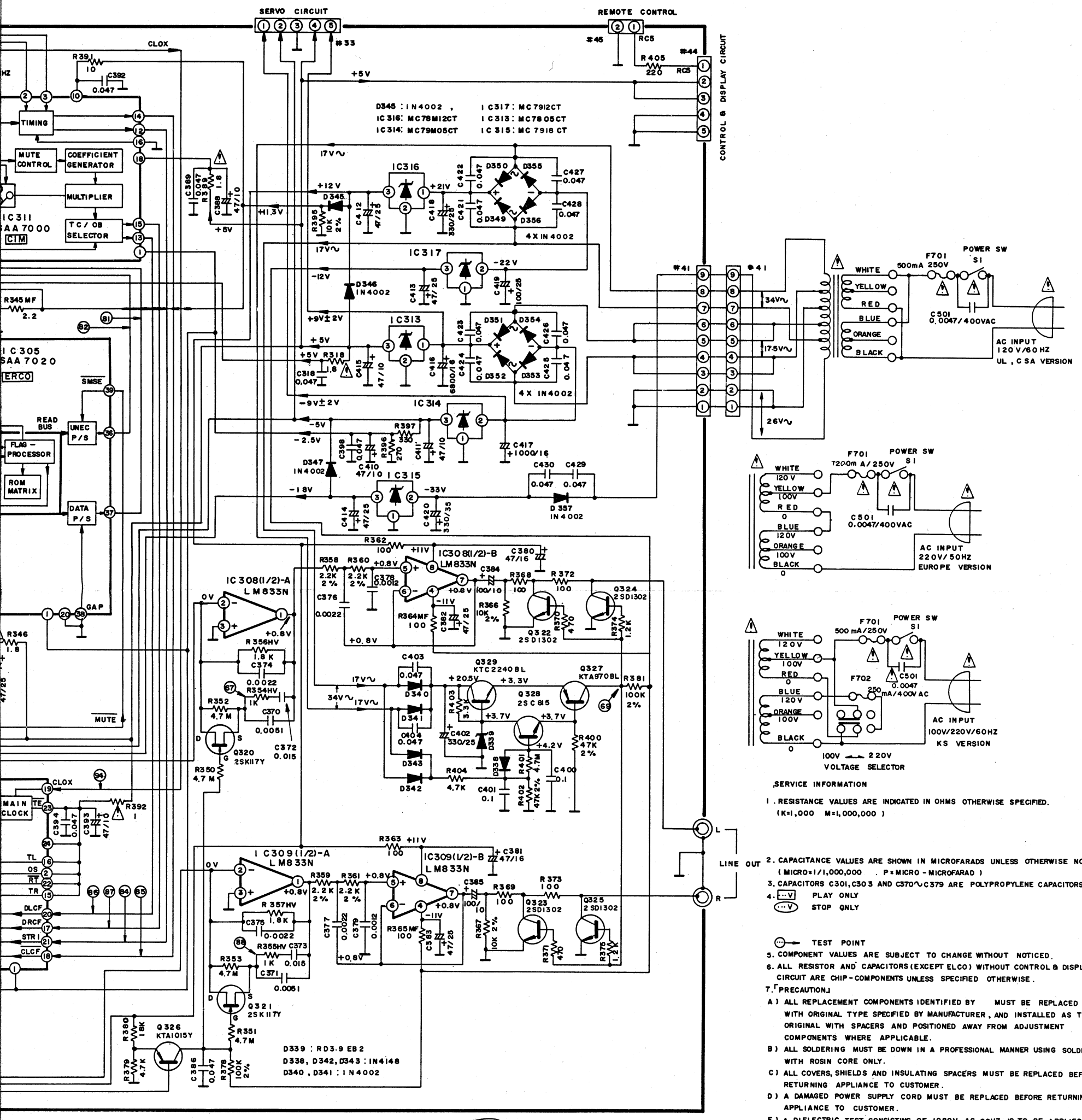
Schematic Diagram
CDP 300R/CDP 310R



Schematic Diagram

CDP 300R/CDP 310

chematic Diagram
DP 300R/CDP 310R



SERVICE INFORMATION

1. RESISTANCE VALUES ARE INDICATED IN OHMS OTHERWISE SPECIFIED. (K=1,000 M=1,000,000)
2. CAPACITANCE VALUES ARE SHOWN IN MICROFARADS UNLESS OTHERWISE NOTED. (MICRO=1/1,000,000 . P=MICRO-MICROFARAD)
3. CAPACITORS C301, C303 AND C370~C379 ARE POLYPROPYLENE CAPACITORS(2%)
4. [···V] PLAY ONLY
   (···V) STOP ONLY

   ⊙ TEST POINT
5. COMPONENT VALUES ARE SUBJECT TO CHANGE WITHOUT NOTICED.
6. ALL RESISTOR AND CAPACITORS (EXCEPT ELCO) WITHOUT CONTROL & DISPLAY CIRCUIT ARE CHIP-COMPONENTS UNLESS SPECIFIED OTHERWISE.
7. 「PRECAUTION」

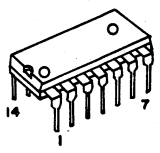
A) ALL REPLACEMENT COMPONENTS IDENTIFIED BY ⚠ MUST BE REPLACED ONLY WITH ORIGINAL TYPE SPECIFIED BY MANUFACTURER, AND INSTALLED AS THE ORIGINAL WITH SPACERS AND POSITIONED AWAY FROM ADJUSTMENT COMPONENTS WHERE APPLICABLE.

B) ALL SOLDERING MUST BE DOWN IN A PROFESSIONAL MANNER USING SOLDER WITH ROSIN CORE ONLY.

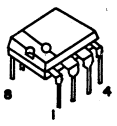
C) ALL COVERS, SHIELDS AND INSULATING SPACERS MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER.

D) A DAMAGED POWER SUPPLY CORD MUST BE REPLACED BEFORE RETURNING APPLIANCE TO CUSTOMER.

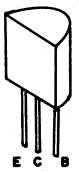
E) A DIELECTRIC TEST CONSISTING OF 1080V AC 60HZ IS TO BE APPLIED BETWEEN BOTH BLADES OF THE POWER SUPPLY CORD ATTACHMENT PLUG AND THE EXPOSED CONDUCTIVED SURFACE OF THE APPLIANCE FOR A PERIOD OF NOT LESS THAN ON SECOND BEFORE RETURNING APPLIANCE TO CUSTOMER.



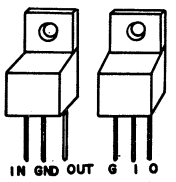
N 74LS 74 AN



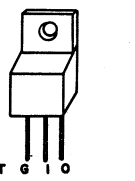
LM 833N



KTC 2240 BL



MC78M12CT
MC7805CT



MC7918CT
MC79M05CT
MC79M12CT